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NOTICE OF ALLOWANCE AND FEE(S) DUE

23122 7590 02/19/2010
RATNERPRESTIA
P.O. BOX 980
VALLEY FORGE, PA 19482

EXAMINER	
MALEK, LEILA	
ART UNIT	PAPER NUMBER

2611
DATE MAILED: 02/19/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/520,028 12/28/2004

Yoichi Nakagawa

MAT-8645US

9202

TITLE OF INVENTION: TRANSMITTING APPARATUS RECEIVING APPARATUS, RADIO COMMUNICATION METHOD AND RADIO COMMUNICATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	05/19/2010

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE** OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

23122 7590 02/19/2010

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

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nonprovisional	NO	\$1510	\$300	\$0	\$1810	05/19/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
MALEK, LEILA	2611	375-260000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

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10/520,028	12/28/2004	Yoichi Nakagawa	MAT-8645US	9202
23122	7590	02/19/2010	EXAMINER	
RATNERPRESTIA P.O. BOX 980 VALLEY FORGE, PA 19482			MALEK, LEILA	
			ART UNIT	PAPER NUMBER

2611

DATE MAILED: 02/19/2010

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 722 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 722 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability**Application No.**

10/520,028

Examiner

LEILA MALEK

Applicant(s)

NAKAGAWA ET AL.

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 01/25/2010.
2. ☒ The allowed claim(s) is/are 2,5,8,9,11,12 and 23-27.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to the amendments received on 01/25/2010.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Lawrence Ashery on 02/04/2010.

The application has been amended as follows:

- a. In the drawings Figs. 1A, 1B, 1C, and 23 have been labeled as prior art.
- b. In claim 2, the first three paragraphs in the body of the claim have been amended as follows:

an array antenna including M, pieces of antenna elements for receiving a carrier modulation signal of a known symbol that is transmitting from a radio station and for transmitting a signal to the radio station, where M is an integer of 2 or more;

a frequency conversion means for converting the carrier modulation signal into a baseband signal;

a reference symbol generation means for generating a reference symbol that gives a phase reference and is the same symbol with the known symbol;

a propagation channel estimation means for generating receiving symbols from a baseband signal received at the antenna elements the baseband signal based on the

reference symbol, wherein the receiving symbols are estimate values for a complex propagation channel between a transmitting antenna of the radio station and the array antenna;

c. The body of claim 9, has been amended as follows:

an array antenna including M, pieces of antenna elements for receiving a carrier modulation signal of a known symbol that is transmitting from a radio station and for transmitting a signal to the radio station, where M is an integer of 2 or more;

frequency conversion means for converting the carrier modulation signal into a baseband signal;

~~a~~ reference symbol generation means for generating a reference symbol that gives a phase reference and is the same symbol with the known symbol;

~~a~~ propagation channel estimation means for generating receiving symbols from a baseband signal received at the antenna elements based on the reference symbol, wherein the receiving symbols are estimate values for a complex propagation channel between a transmitting antenna of the radio station and the array antenna,

wherein said propagation channel estimation means, after applying a reverse spread separation process to the baseband signal received at the M pieces of antenna elements with N pieces of spread codes, generates "M x N" pieces of receiving symbols that are estimate values of a complex propagation channel based on the reference symbol, where N is an integer of 2 or more;

~~a~~ transmitting symbol calculation means for calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors,

wherein the transmitting symbol calculation means calculates plural sets of transmitting symbol vectors from " $M \times N$ " pieces of receiving symbols for each of N pieces of spread codes so that each transmitting symbol vector is configured by M pieces of transmitting symbols and then generating reference tables configured by the plural sets of transmitting symbol vectors;

a-symbol mapping means for generating transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data,

wherein the symbol mapping means generates " $M \times N$ " pieces of transmitting symbols by selecting one set of transmitting symbol vector from each of the N pieces of reference tables that correspond to the N pieces of spread codes respectively, based on transmitting data including confidential information;

a carrier modulation means for generating baseband signals from the transmitting symbols,

wherein the carrier modulation means generates transmitting baseband signals from the " $M \times N$ " pieces of transmitting symbols by spread process with N pieces of reverse spread codes; and

a transmitting means for converting baseband signals to radio frequency signals to transmit the radio frequency signals to the radio station through the array antenna.

d. The body of claim 23, has been amended as follows:

transmitting information known by both radio stations from the second radio station to the first radio station;

estimating a propagation parameter, which is a parameter of a propagation channel shared only between the first radio station and the second radio station, based

on the known information and received information transmitted from the second radio station by the first radio station;

transmitting data from the first radio station to the second radio station by superimposing the transmitting data including a confidential information on the estimated propagation parameter;

calculating a plurality of propagation parameters that are obtained from receiving signals of a plurality of antennas in the second radio station; and

reconstructing the transmitting data based on a plurality of propagation parameters calculated by the second radio station, wherein

said step of estimating a propagation parameter includes the steps of

generating a receiving symbol from the information transmitted from the second radio station, ~~and~~

calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, wherein the plural sets of transmitting symbol vectors is for controlling any one of receiving power and phase of the radio station-; and

transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data.

e. The body of claim 24, has been considered as follows:

transmitting information known by both radio stations from the second radio station to the first radio station;

estimating a propagation parameter, which is a parameter of a propagation channel shared only between the first radio station and the second radio stations, based

on the known information and received information transmitted from the second radio station by the first radio station;

transmitting data from the first radio station to the second radio station by superimposing the transmitting data on the estimated propagation parameter;

calculating a plurality of propagation parameters obtained from receiving signals of a plurality of antennas in the second radio station; and

reconstructing the transmitting data based on the a plurality of propagation parameters calculated in the second radio station,

wherein said step of estimating a propagation parameter includes the steps of

generating a receiving symbol from the information transmitted from the second radio station, ~~and~~

calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, wherein the plural sets of transmitting symbol vectors is for controlling any one of receiving power and phase of the radio station- : and

transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data.

Allowable Subject Matter

3. Claims 2, 5, 8, 9, 11, 12, and 23-27 are allowed. The following is an examiner's statement of reasons for allowance: As to claims 2 and 9, a comprehensive search of prior art of record (e.g., see patent # 6,760,388) failed to teach either alone or in combination a transmitting apparatus comprising: an array antenna for receiving a

carrier modulation signal of a known symbol; a propagation channel estimation means for generating receiving symbols from a baseband version of the received signal at the antenna array, wherein the receiving symbols are estimate values for a complex propagation channel between a transmitting antenna of a radio station and the array antenna; a transmitting symbol calculation means for calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors; a symbol mapping means for generating transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data; a carrier modulation means for generating baseband signals from the transmitting symbols; a transmitting means for converting baseband signals to radio frequency signals to transmit the radio frequency signals to the radio station through the array antenna. As to claims 23, 24, and 27, a comprehensive search of prior art of record failed to teach either alone or in combination a method comprising: transmitting information known by both radio stations from the second radio station to the first radio station; estimating a propagation parameter, which is a parameter of a propagation channel shared only between the first radio station and the second radio stations, based on the known information and transmitted from the second radio station by the first radio station, wherein said step of estimating a propagation parameter includes the steps of generating a receiving symbol from the information transmitted from the second radio station, calculating plural sets of transmitting symbol vectors from the receiving symbols

so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, wherein the plural sets of transmitting symbol vectors is for controlling any one of receiving power and phase of the radio station; and transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEILA MALEK whose telephone number is (571)272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Leila Malek
Examiner
Art Unit 2611

/L. M./
/Leila Malek/
Examiner, Art Unit 2611

/Mohammad H Ghayour/
Supervisory Patent Examiner, Art Unit 2611